AR201-13278B

ROBUST SUMMARY
FYROL FR-2
CAS#13674-87-8

CHEMICAL AND PHYSICAL PROPERTIES:
BOILING POINT

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	Method Unknown
Test Type:	Boiling Point Determination
GLP Compliant:	**No**
Year Test Performed:	Unknown
Species:	Not Applicable
Statistical Methods:	Not Applicable
Remarks:	The boiling point of tris(1,3-dichloro-2) phosphate is listed in several authoritative handbooks, in the Hazardous Substance Data Bank, and in a WHO publication.
Results:	The boiling point has been determined to be 236-237°C at 5 mm Hg.
Conclusion:	Boiling Point: 236-237°C at 5 mm Hg
Data Quality:	Reliable with restriction. Value is from a reliable handbook, a data base, and from a WHO document.
References:	The Merck Index, 10th ed., Merck Company, Rahway, N.J., 1983, page 617; Hazardous Substance Data Bank, National Library of Medicine, 200 1; International Program on Chemical Safety, Environmental Health Criteria 209, Flame Retardants, World Health Organization, 1998;
Other:	Prepared March 12, 2001, Revised August 16, 2001

ROBUST SUMMARY
FYROL FR-2
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CHEMICAL AND PHYSICAL PROPERTIES:
VAPOR PRESSURE

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	Method Unknown,
Test Type:	Vapor Pressure Determination
GLP Compliant:	Unknown
Year Test Performed:	Unknown
Species:	Not Applicable
Statistical Methods:	Not Applicable
Remarks:	The vapor pressure of tris(1,3-dichloropropyl-2) phosphate is listed in an authoritative text, in a handbook, on an electronic data base, in an EPA Report, and in a Consumer Product Safety Commission Review Document.
Results:	The vapor pressure is reported as 0.01 mm @ 30°C.
Conclusion:	Vapor Pressure = 0.01 mm @30°C.
Data Quality:	Reliable with restriction. Derived from reliable handbook, text, CPSC report and EPA document.
Reference:	International Program on Chemical Safety, Environmental Health Criteria 209, Flame Retardants, World Health Organization, 1998; Toxicity Review of Tris (1,3-dichloropropyl-2) Phosphate, Consumer Product Safety Commission, Washington, DC, 1999; Hazardous Substance Data Base, National Library of Medicine, 2001; Land, S.S et al., Investigation of Selected Potential Environmental Contaminants: Haloalkyl Phosphates, EPA-560/2-76-007, NTIS BP-257910, 1976;
Other:	Prepared March 12, 2001 Revised August 16, 2001

ROBUST SUMMARY
FYROL FR-2
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HUMAN HEALTH EFFECTS ELEMENTS: GENERAL TOXICITY (REPEATED DOSE)

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	OECD Guideline 453
Test Type:	Combined Chronic Toxicity/Carcinogenicity Study
GLP Compliant:	No
Years Test Performed:	1978-1981
Species:	Sprague-Dawley Rats
Sex:	Male and Female
Duration of Test:	24 Months
Route of Administration:	Dietary (blended in the diet)

Dose/Concentration Levels: 0, 5, 20, and 80 mg/kg/day

Statistical Methods:	Body weight, food consumption, and organ weights of treated groups were compared to control by the Dunnett's test. Hematology and clinical chemistry parameters were analyzed using the F-test and Student's t-test. Mortality incidence was analyzed by the chi-square method. Tumor incidence was examined by the Fisher Exact test (one tailed).
Remarks on Test Conduct:	This study was conducted to determine the chronic toxicity and carcinogenic potential of Fyrol FR-2 when administered to rats for 24 months. Each of the four groups consisted of 60 male and 60 female rats. Dietary doses administered were 0, 5, 20, or 80 mg/kg/day. Diets were adjusted weekly for 13 weeks and then biweekly from week 14 through 104. Ten animals per sex per group were used for an interim sacrifice after 12 months. The animals were observed daily for clinical signs, morbidity and mortality. Body weights, food consumption, hematological and

clinical chemistry parameters, ophthalmoscopic examinations, and urinalysis were performed periodically on a defined schedule.

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HUMAN HEALTH EFFECTS ELEMENTS: GENERAL TOXICITY (REPEATED DOSE)

Surviving animals were sacrificed at the end of the 24th month and were subjected to gross examination during necropsy. Microscopic examinations were performed on all tissues from the control and high dose animals and on gross lesions, tissue masses, liver, kidneys, adrenal glands, and testes from the low and mid dose animals. Organ weights were recorded at the interim and terminal necropsies.

Results:

Mortality in the high dose males was significantly higher that that of the control males, beginning early in the study's second year. The mortality observed for the other groups was comparable to the control group. Body weights of the high dose males and females were significantly lower than the weights of the control animals through most of the study. The increased mortality and decreased body weights in the high dose animals confirms that the high dose was the maximum tolerated dose (MTD). Most of the mid and low dose animals had body weights that were comparable to the control animals. Food consumption appeared unaffected by treatment in all groups. Certain hematological values were lower in the high dose animals, as was serum alkaline phosphatase levels at most intervals. Clinical observations and urinalysis revealed no treatment-related differences between groups.

A higher incidence of gross postmortem anomalies of the liver, kidneys, testes, and seminal vesicles were observed in treated animals. Microscopic examination of the tissues revealed a higher incidence of morphologic alterations in the liver, renal cortex, testes, and adrenal cortex in the treated animals, primarily in the high dose group. At 24 months, there was no statistically significant increase in the incidence of any non-neoplastic tissue change in any of the treated animals. A relatively small number of typical age-related tissue changes were observed microscopically in the treated animals, including liver (hepatocellular alterations), kidneys (chronic nepbropathy, hyperplasia of the convoluted tubular epithelium), testes (oligospermia, accumulation of material within the seminiferous tubular lumens), parathyroid glands

(hyperplasia), spleen (myeloid metaplasia), and bone marrow (erythroid/myeloid hyperplasia). While there was a greater number

HUMAN HEALTH EFFECTS ELEMENTS: GENERAL TOXICITY (REPEATED DOSE)

of these alterations in the high dose animals, they were also observed in animals from the other groups.

A significant increase in benign adrenal cortical tumors were seen in high dose females and hepatocellular adenomas were observed in both male and female high dose animals. A significant increase in renal cortical adenomas was seen in both sexes and testicular interstitial cell tumors were observed in male animals from the high and mid dose groups. Hepatocellular adenomas, benign interstitial cell tumors, and benign adrenal cortical tumors commonly occur in aging rats. Chronic administration of Fyrol FR-2 apparently exacerbates the formation of these spontaneously occurring tumors.

The body weight difference between the high dose and control animals of more than 20% at the end of the study suggests the high dose exceeded the MTD and may have made the animals more susceptible to the chronic toxicity of the test substance. An NOEL for toxicity and benign neoplasms was the dietary dose of 5 mg/kg/day.

Conclusion: Chronic dietary administration of Fyrol FR-2 to rats resulted in the induction of benign neoplasms in the liver, kidney, testes, and adrenal cortex. The NOEL for chronic toxicity and the induction of benign tumors is 5 mg/kg/day.

Data Quality: Reliable with restrictions. A high dose satellite group was not included. The high dose caused a body weight loss in excess of 10% at the end of the study. Mortality in the high dose males at the end of the study was in excess of 50%. Although over 40 tissues were taken for microscopic examination, tissues listed in the OECD guideline that were not examined include rectum, esophagus, thoracic and lumbar regions of the spinal cord, and sternum.

Reference: This robust summary was prepared by an individual company. The full study has been published in the International Journal of Toxicology, 19: 119-125, 2000, as a peer-reviewed article.

Other: Prepared January 16, 2001 Revised August 16, 2001

ROBUST SUMMARY
FYROL FR-2
CAS#13674-87-8

HUMAN HEALTH EFFECTS ELEMENTS: DEVELOPMENTAL TOXICITY

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	OECD Guideline 414
Test Type:	Developmental Toxicity (Teratology)
GLP Compliant:	No
Year Test Performed:	1978
Species:	Sprague-Dawley Rats
Sex:	Pregnant females dosed gestation days 6 through 15
Duration of Test:	20 days
Route of Administration:	Oral Gavage

Dose/Concentration Levels: 0, 25, 100, and 400 mg/kg/day

Statistical Methods:	Body weight, food consumption, ovarian and uterine weights, and fetal weights were evaluated by the Student's t -test and Cochran's approximation of t(t'). Reproduction indices were analyzed by the chi-square method using a probability level of 0.05.
Remarks on Test Conduct:	This study was conducted to determine the teratogenic potential of Fyrol FR-2 in pregnant rats. The test substance was administered daily by oral gavage from gestation day 6 through gestation day 15 to groups of rats (20 pregnant rats per group) at doses of 0, 25, 100, or 400 mg/kg/day. Data collected and evaluated include animal appearance, behavior, survival, body weight changes, food consumption, pregnancy rates, liter size, fetal viability, number of corpora lutea per uterus, number of implants and resorptions, fetal pathology (visceral and skeletal), and other information specified in the guideline.

Results: Three animals in the high dose group died (one from improper handling). No deaths occurred in the other groups. Beginning on

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Results. continued: day 7, some high dose animals expressed clinical signs including urine stains, hunched appearance, and alopecia. The urine stains and alopecia persisted to day 19. Sporadic signs were seen in a few mid dose animals, primarily urine stains and hunched appearance. There were no clinical signs in the low dose group. There was a significant decrease in body weight gain followed by a mean body weight loss in the high dose group. Low food consumption was noted in the high dose group throughout the study. No treatment related effects were seen on the mean number of corpora lutea or implantation efficiency. Implantation efficiency increased from 86% in the control animals to 93% in the high dose animals.

Embryo and fetotoxicity were observed at the high dose, including a significant increase in resorptions and a corresponding decrease in fetal viability, lower mean fetal weight and length. Resorptions ranged from a low of 6.3% in the mid dose group (control group had 6.7%) to 14.4% in the high dose group. Fetal viability in the control, low, and mid dose groups were 93.3%, 91.1%, and 93.7%, whereas viability in the high dose group was significantly lower at 85.6%. The incidence of delayed skeletal development observed in high dose fetuses, reported as incomplete ossification, was not significantly different from that of the control fetuses. Incomplete ossification was also observed in control animals and in the lower dose groups. There was no indication of teratogenicity. Only one malformation was found in this study, an umbilical hernia in one low dose fetus, which was not treatment related. All other changes were reported as representative of developmental variations. Since there were no treatment-related effects in the low dose animals, the NOEL is 2.5 mglkgiday for general toxicity. The NOEL for developmental toxicity is 100 mg/kg/day.

Conclusion: Fyrol FR-2 does not demonstrate teratogenic activity. The high dose caused maternal, embryo and feto-toxicity without inducing developmental defects. The NOEL for general toxicity is 2.5 mglkgiday and for developmental toxicity is 100 mg/kg/day.

Data Quality:	Reliable without restrictions
Reference:	This robust summary was prepared by an individual company from an unpublished study. The underlying study contains confidential business information.
Other:	Prepared January 12 ,200 1 Revised August 17, 2001

ROBUST SUMMARY
FYROL FR-2
CAS#13674-87-8

ECOTOXICITY ELEMENTS: ACUTE TOXICITY TO FISH

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	OECD Guideline 203
Test Type:	Acute toxicity to fish
GLP Compliant:	Yes
Year Test Performed:	1990
Species:	Rainbow trout (*Salmo gairdneri)*
Route of Administration:	Added to the water in the test chamber
Duration of Test:	96 Hour exposure to Fyrol FR-2

Dose/Concentration Levels: 0 (negative control), 0.63, 1.25, 2.5, 5, and 10 mg/l

Statistical Methods:	Median lethal concentration (LC50) was determined using the computer program of Stephan, incorporating the number of fish exposed and the mortality observed at each concentration.
Remarks on Test Conduct:	This study was conducted to determine the acute toxicity of Fyrol FR-2 to the rainbow trout under static conditions with an exposure of 96 hours. Initially two range-finding tests were conducted to determine the appropriate doses (water concentrations) for the definitive study. In these preliminary tests, the highest concentration at which no mortality occurred and the lowest dose that caused 100% mortality were 0.1 and 10 mg/l, respectively. In the definitive test, groups consisting of ten trout were exposed to Fyrol FR-2 at nominal concentrations of 0 (negative control), 0.63, 1.25, 2.5, 5, and 10 mg/l for 96 hours. Observations were made for signs of toxicity after 2, 4, 24, 48, 72, and 96 hours of exposure. Measurements of water parameters were as follows: temperature range, 11.8 to 14.8°C; pH from 7.14 to 7.78; dissolved oxygen concentration ranged from 92 to 100% air saturation value (ASV); water hardness, 218 to 228 mg/l as $CaCO_3$. Other test conditions

include a photoperiod of 16 hours light, 8 hours dark; an unsealed all-glass 15 liter aquaria; aeration was via compressed air.

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ECOTOXICITY ELEMENTS: ACUTE TOXICITY TO FISH

Results:	Mortality was dose-related, with a clear dose-response observed. All mortalities occurred within the first 24 hours. One fish died in the lowest dose group (0.63 mg/l) at 24 hours. Mortality of 100% occurred in the 5 mg/l and 10 mg/l groups. The median lethal concentration (LC50) of Fyrol FR-2 was determined to be 1.4 mg/l, with 95% confidence limits of 0.9 and 1.9 mg/l. Since one fish died in the lowest dose group, an NOEC was not observed and is therefore less than 0.63 mg/l.
Conclusion:	The 96 hour LC50 value for Fyrol FR-2 in rainbow trout was determined to be 1.4 mg/l, with confidence limits of 0.9 to 1.9 mg/l.
Data Quality:	Reliable without restrictions
Reference:	This robust summary was prepared by an individual company from an unpublished study. The underlying study contains confidential business information.
Other:	Prepared January 11, 2001 Revised August 17, 2001

ROBUST SUMMARY
FYROL FR-2
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ECOTOXICITY ELEMENTS: ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	OECD Guideline 202; EPA Series 8.50 OPPTS Number 850.1010
Test Type:	48-Hour Flow-Through Acute Toxicity Test with Cladoceran (*Daphnia magna*)
GLP Compliant:	Yes
Year Test Performed:	*1999*
Species:	*Daphnia magna*
Strain:	Not Applicable
Route of Administration:	Added to the water in the test chambers containing the *Daphnia*
Duration of Test:	Test organisms were continuously exposed for 48 hours

Dose/Concentration Levels: Negative Control, Solvent Control, 0.98, 1.6, 2.8, 3.8, and 5.1 mg/l (measured levels)

Statistical Methods:	The EC50 value was calculated using the EPA program developed by C.E. Stephan. The program calculates the EC50 and the 95% confidence interval by probit analysis, the moving average method, and binomial probability with nonlinear interpolation.
Remarks on Test Conduct:	Two replicate test chambers, each containing 10 daphnids, were utilized for each group. Dapnids were exposed in seven groups, which consisted of a negative control, solvent control (dimethyl-formamide), and five concentrations of Fyrol FR-2 (listed above). Test substance was added to the chamber 22 hours before the daphnids to achieve equilibrium. Water conditions were as follows: temperature was maintained at 20±2°C, dissolved oxygen was ≥8.5 mg/l (94% of saturation), hardness was maintained at about 126 mg/l as $CaCO_3$, pH at 8.3. and total organic carbon ranged from less than I at study start to 2.6 mg C/l at the end of day 2. Photoperiod

ECOTOXICITY ELEMENTS: ACUTE TOXICITY TO AQUATIC INVERTEBRATES

	was 16 hours of light and 8 hours dark. Test containers were 300 ml glass beakers. The solvent control group were exposed to 0.1 ml dimethylformamide. Observations were made at 1, 24, and 48 hours for mortality/immobility and clinical signs. Samples were taken from test chambers at the start and end of the test to quantify the concentration of the test substance, using GC with electron capture detection.
Results:	Environmental conditions, including dissolved oxygen, pH, and temperature were within guideline and protocol specifications. Daphnids in the negative and solvent control groups appeared healthy and normal throughout the test. Daphnids in the 0.98 and 1.6 mg/l groups also appeared normal with no mortality or signs of toxicity. After 48 hours of exposure, mortality/immobility in the 2.8, 3.8, and 5.1 mg/l groups was 0, 70, and 80%. Although no mortality occurred at 2.8 mg/l, 15% of the daphnids appeared lethargic at test termination. The 48 hr EC50 was determined to be ***3.8*** mg/l.
Conclusions:	The 48 hour EC50 for ***Daphnia magna*** was 3.8 mg Fyrol FR-2/l. The 95% confidence limits were 3.5 and 4.2 mg/l. The NOEL was 1.6 mg/l.
Data Quality:	Reliable without restrictions
Reference:	This robust summary was prepared by an individual company from an unpublished study. The underlying study contains confidential business information.
Other:	Prepared on January 10,200 1. Revised August 17.2001

ROBUST SUMMARY
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ECOTOXTCITY ELEMENTS: TOXICITY TO AQUATIC PLANTS

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	OECD Guideline 201
Test Type:	Alga Growth Inhibition Test (toxicity to the freshwater alga)
GLP Compliant:	Yes
Year Test Performed:	*1992*
Species:	*Selenastrum capricornutum*
Route of Administration:	Added to the water in the test chamber containing the alga
Duration of Test:	96 Hour exposure to Fyrol FR-2
Dose/Concentration Levels:	0 (negative control), 2, 6, 18, 54, and 162 mg/l
Statistical Methods:	The EC20, EC50, and EC80 values were determined using least square method (best fit through the points) obtained from the probit of the percent inhibition and the log of the concentration of Fyrol FR-2. Confidence limits were calculated using Fieller's theorem.
Remarks on Test Conduct:	A dose range-finding test was initially conducted to identify the appropriate concentrations of Fyrol FR-2 for use in the definitive test. The range-finding doses were 0.1, 1, 10, and 100 mg/l. Since growth inhibition was observed in the IO and 100 mg/l cultures, the definitive test used nominal concentrations of 2, 6, 18, 54, and 162 mg/l. Algal growth was determined by measuring the extinction at 436 nm using a spectrophotometer. The direct relationship between extinction values and cell density has been established. Cell density was also determined microscopically using a counting chamber. The extinction value for each vessel was determined at 0, 24, 48, 72, and 96 hours. The alga were maintained under constant light at 2 1 °C. The flasks were constantly shaken at 100 rpm to prevent sedimentation of the algae. The pH ranged from 6.7 at time zero to a high of 7.9 at 96 hours.

Results: The E_bC50 value, determined from the area under the curve, and the

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ECOTOXICITY ELEMENTS: TOXICITY TO AQUATIC PLANTS

E_rC50 value, determined from the specific growth rate, are 12 mg/l (95% confidence limits of 10-15 mg/l) and 39 mg/l (95% confidence limits of 31-50 mg/l), respectively. The NOEL for Fyrol FR-2 was 6 mg/l.

Conclusion: The E_bC50 and E_rC50 values have been determined to be 12 and 39 mg/l, respectively. The NOEL was determined as 6 mg/l.

Data Quality: Reliable without restrictions

Reference: This robust summary was prepared by an individual company from an unpublished study. The underlying study contains confidential business information.

Other: Prepared March 8, 2001 Revised August 17, 2001

ROBUST SUMMARY
FYROL FR-2
CAS# 13674-87-g

CHEMICAL AND PHYSICAL PROPERTIES: WATER SOLUBILITY (Flask Method)

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	OECD Method No. 105
Test Type:	Water Solubility Determination
GLP Compliant:	No
Year Test Performed:	2001
Species:	Not Applicable
Statistical Methods:	Not Applicable.
Remarks on Test Conduct:	The water solubility of Fyrol FR-2 was determined using the Flask Method. A 30 ml volume of distilled and deionized water in an 8 dram vial was saturated with Fyrol FR-2 by adding about 1 gram to the water and then shaking the vial on a mechanical shaker for 16 hours at room temperature. The aqueous portion was removed and centrifuged. A 1 ml sample of the aqueous fraction was diluted with 100 ul methanol and then analyzed by HPLC, using a Zorbax SB C 18 column. After occasionally shaking the vial for 4 days, this process was repeated. The concentration of Fyrol FR-2 in the water was again determined by HPLC. Quantitation of Fyrol FR-2 was achieved by preparing stock solutions of the product were prepared by dissolving 20 g in 10 ml methanol. The HPLC system was calibrated using a concentration range that encompassed the concentration of Fyrol FR-2 found in the water samples.
Results:	The two day water solubility was determined to be 43 ug/ml and the four day water solubility was found to be 42 ug/ml. The average solubility was 42 ug/ml.

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CHEMICAL AND PHYSICAL PROPERTIES: WATER SOLUBILITY (Flask Method)

Conclusion:	The water solubility of Fyrol FR-2 is 42 ug/ml.
Data Quality:	Reliable without restrictions
Reference:	This robust summary was prepared by an individual company from an unpublished study. The underlying study contains confidential business information.
Other:	Prepared on October 15,200 1

ROBUST SUMMARY
FYROL FR-2
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CHEMICAL AND PHYSICAL PROPERTIES: MELTING POINT

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	OECD Guideline 402
Test Type:	Melting Point
GLP Compliant:	No
Year Test Performed:	2001
Remarks on Test Conduct:	The melting point of Fyrol FR-2 was determined using Differential Scanning Calorimetry. A sample of the test substance was placed in the pan of the calorimeter which was then sealed and subjected to a temperature change at the rate of 5°C per minute under nitrogen, from -80°C to 60°C. Thermograms were prepared for examination. Instrument software determined critical thermal events.
Results:	Upon cooling, the sample showed an exothermic rise in baseline that is typical of freezing and solidifying. Between -40°C and -44°C a sharp transition is observed that can be attributed to a crystallization/glassing event, having a midpoint at -42°C. This suggests that liquid Fyrol FR-2 turns into a solid below -40°C. When the solid sample is heated, transition is observed beginning at -58" with a midpoint at -55°C and an upper end of -53°C. These data indicate that Fyrol FR-2 solidifies below -40°C with transition back to liquid beginning at -58°C.
Data Quality:	Reliable without restrictions.
Reference:	This robust summary was prepared by an individual company from an unpublished study. The underlying study contains confidential business information.
Other:	Prepared November 1, 2001

ROBUST SUMMARY
FYROL FR-2
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CHEMICAL AND PHYSICAL PROPERTIES: PARTITION COEFFICIENT (log K_{ow})

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	OECD Method No. 117
Test Type:	n-Octanol/Water Partition Coefficient
GLP Compliant:	No
Year Test Performed:	2001
Species:	Not Applicable
Statistical Methods:	Not Applicable.
Remarks on test Conduct:	The retention times of seven reference compounds with known water solubilities was determined on an octadecyl reverse phase HPLC column. A graph was prepared correlating water solubility with the Log Kow for the reference compounds. Then, the retention time for duplicate samples of Fyrol FR-2 was determined and then correlated with the graph containing the retention times of the reference compounds.
Results:	The n-octanol/water partition coefficient (Kow) was determined experimentally and found to be 2.4.
Conclusion:	The n-octanol/water partition coefficient for Fyrol FR-2 is 2.4
Data Quality:	Reliable without restrictions
Reference:	This robust summary was prepared by an individual company from an unpublished study. The underlying study contains confidential business information.
Other:	Prepared March 12, 2001, Revised October 15, 2001

ROBUST SUMMARY
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ENVIRONMENTAL FATE AND PATHWAY ELEMENTS: PHOTODEGRADATION

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	EPA and Syracuse Research Corporation 2000 EPIWIN v.3.10
Test Type:	Photodegradation
GLP Compliant:	No
Year Test Performed:	2001
Species:	Not Applicable
Statistical Methods:	Not Applicable
Remarks on Test Conduct:	Data entered into the model are as follows: Melting Point: -40°C Log Kow: 2.4 Water Solubility: 42 mg/L
Results:	Atmospheric Oxygen (25°C) [AopWin v 1.901 Hydroxyl Radicals Reaction: Overall OH Rate Constant = 18.08 18 x 10^{-12} cm^3/molecule-sec Half-Life = 0.592 Days (12 hour day; 1.5 x 10^6 cm^3) Half-Life = 7.098 Hours
Data Quality:	Reliable without restrictions
Reference:	This robust summary was prepared by an individual company. The underlying study contains confidential business information.
Other:	Prepared November 5,200 1

ROBUST SUMMARY
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ENVIRONMENTAL FATE AND PATHWAY ELEMENTS: FUGACITY

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	Level III Fugacity Model, Syracuse Research Corporation
Test Type:	Fugacity (EPIWIN v 3.10)
GLP Compliant:	No
Year Test Performed:	2001
Remarks on Test Conduct:	The Level III Fugacity Model calculations were determined using four simulations: on with 1000 kg/hour emitted to air only, one with 1000 kg/hour emitted to water only, one with 1000 kg/hour emitted to soil only, and one using the default emissions of equal amount to soil, air, and water (I 000 kg/hour for each). For emissions into air or soil, the majority of Fyrol FR-2 was predicted to be in the soil compartment. Using the default emissions of equal amount to water, air, and soil, the percentages of Fyrol FR-2 in water air, and soil are estimated to be 18.3, <0.1, and 8 1.6%, respectively.
Results:	Level III Distribution (% Distribution) of Fyrol FR-2

	Air	Water	Soil
Air Only – 1000 kg/hr	<0.2	9.3	90.6
Water Only – 1000 kg/hr	<0.1	99.3	<0.1
Soil Only 1000 kg/hr	<0.1	7.0	92.9
Combined 1000 kg/hr	<0.1	18.3	81.6

Data used in model: Melting point: -40°C; Water solubility, 42 mg/L; Log Kow: 2.4

Data Quality:	Reliable without restrictions
Reference:	This robust summary was prepared by an individual company. The underlying study contains confidential business information.
Other:	Prepared November 5, 2001

ROBUST SUMMARY
FYROL FR-2
CAS#13674-87-8

HUMAN HEALTH EFFECTS ELEMENTS: SKIN SENSITIZATION

Chemical Name:	Tris(1,3-dichloropropyl-2) phosphate
Method/Guideline:	OECD Guideline 406
Test Type:	Skin Sensitization
GLP Compliant:	Yes
Year Test Performed:	2001
Species:	Guinea Pigs
Sex:	Unknown
Duration of Test:	23 days
Route of Administration:	Intradermal Injection
Dose level:	Per Guideline
Statistical Methods:	Not Applicable.
Remarks on Test Conduct:	On day zero three pairs of intradermal injections were made to the shoulder region of each animal which had been cleared of hair. One injection consisted of a 1: 1 mixture of Freunds Complete Adjuvent (FCA) and saline solution. A second injection contained the test substance. The third injection contained the test substance and FCA as a 1: 1 mixture. The control animals received three injections consisting of the 1: 1 FCA saline mixture, undiluted vehicle, and a mixture of vehicle and FCA/water mix. On day 6, 24 hours before the topical induction application, sodium lauryl sulfate was applied to the sites to enhance local irritation. On day 7, the test substance was applied to the application sites. Control animals received vehicle only. On day 21 the animals received the challenge dose by dermal application and the test substance was held in place for 24 hours. The animals were subsequently observed for irritation and sensitization. A grade of from 0 to 4 was used, 0 being no visible change to the application sites.

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HUMAN HEALTH EFFECTS ELEMENTS: SKIN SENSITIZATION

Results:	The application sites on the treated animals were scored for erythema. The sensitization score was 0 indicating Fyrol FR-2 is not a chemical sensitizer.
Data Quality:	Reliable without restrictions.
Reference:	This robust summary was prepared by an individual company from an unpublished study. The underlying study contains confidential business information.
Other:	Prepared October 3 1, 200 1